

What is claimed is:

1. A method for adapting a wireless communication system comprising the steps of:

selecting a desired functionality of said wireless communication system; and

5 adapting said wireless communication system to support said desired functionality at an optimized economic benefit.

2. The method of claim 1 wherein said desired functionality is defined by criteria selected from one or more of a maximum range of communication with said wireless communication system, quality of a transmission link in said wireless communication system, capacity of said wireless communication system, power consumption of said wireless communication system, protocols supported in said wireless communication system, modulation techniques used in said wireless communication system and processing techniques for combining signals in said wireless communication system.

15 3. The method of claim 1 wherein said adapting step further comprises the step of:

determining a reference design having a maximum number of antennas of a transmitter or receiver, a maximum number of RF chains at a transmitter or receiver, maximum power consumption and processing techniques for implementing maximum functionality and said reference design is adapted to support said desired functionality.

20 4. The method of claim 1 wherein in said adapting step said wireless communication system is adapted by adapting a number of antennas used at a transmitter or receiver of said wireless communication system.

5. The method of claim 1 wherein in said adapting step said wireless communication system is adapted by adapting a number of RF chains used at a transmitter or receiver of said wireless communication system.

25 6. The method of claim 1 wherein in said adapting step said wireless communication system is adapted by including antenna selection diversity used with a determined number of diversity antennas of said wireless communication system.

7. The method of claim 6 wherein said diversity antennas are obtained from one or more of spatial diversity, beam diversity, polarization diversity, angular diversity, and pattern diversity.

8. The method of claim 1 wherein in said adapting step said wireless communication is adapted by adapting power consumption of said wireless communication system.

9. The method of claim 8 wherein said power consumption is adapted by one or more of adapting a number of antennas used at a transmitter or receiver of said wireless communication system, adapting a number of RF chains used at a transmitter or receiver of said wireless communication system or selection of a power control algorithm.

10. The method of claim 1 wherein in said adapting step said wireless communication is adapted by selection of processing techniques for processing signals of one or more of the antennas used at a transmitter or receiver of said wireless communication system.

11. The method of claim 10 wherein said processing techniques are selected from one or more of maximal ratio combining (MRC), equal-gain combining, and minimum mean square error (MMSE) combining.

12. The method of claim 1 wherein in said adapting step said optimized economic benefit is determined by the steps of:

- a. determining performance and cost of the adapted wireless communication system;
- b. determining if said determined performance and cost satisfy the desired functionality; and
- c. repeating said adapting step and steps a and b until said determined performance and cost satisfy the desired functionality.

13. A system for adapting a wireless communication system comprising:  
means for selecting a desired functionality of said wireless communication system; and

means for adapting said wireless communication system to support said desired functionality at an optimized economic benefit.

14. The system of claim 13 wherein said desired functionality is defined by criteria selected from one or more of a maximum range of communication with said wireless communication system, quality of a transmission link in said wireless communication system, capacity said wireless communication system, power consumption of the wireless communication system, protocols supported in the wireless communication system, modulation techniques used in the wireless communication system and processing techniques for combining signals in the wireless communication system.

15. The system of claim 13 wherein said means for adapting said wireless communication system further comprises:

means for determining a reference design having a maximum number of antennas of a transmitter or receiver, a maximum number of RF chains at a transmitter or receiver, maximum power consumption and processing techniques for implementing maximum functionality and said reference design is adapted to support said desired functionality.

16. The system of claim 13 wherein said mean for adapting said wireless communication system further comprises:

means for adapting a number of antennas used at a transmitter or receiver of said wireless communication system.

17. The system of claim 13 wherein said means for adapting said wireless communication system further comprises:

means for adapting a number of RF chains used at a transmitter or receiver of said wireless communication system.

18. The system of claim 13 wherein said means for adapting said wireless communication system further comprises antenna selection diversity used with a determined number of diversity antennas of said wireless communication system.

19. The system of claim 18 wherein said diversity antennas are obtained from one or more of spatial diversity, beam diversity, polarization diversity, angular diversity, and pattern diversity.

20. The system of claim 13 wherein said means for adapting said wireless communication system further comprises:

means for adapting power consumption of said wireless communication system.

21. The system of claim 20 wherein said power consumption is adapted by one or more of adapting a number of antennas used at a transmitter or receiver of said wireless communication system, adapting a number of RF chains used at a transmitter or receiver of said wireless communication system or selection of a power control  
5 algorithm.

22. The system of claim 13 wherein said means for adapting said wireless communication system comprises selection of processing techniques for processing signals of one or more of the antennas used at a transmitter or receiver of said wireless communication system.

10 23. The system of claim 22 wherein said processing techniques are selected from one or more of maximal ratio combining (MRC), equal-gain combining, and minimum mean square error (MMSE) combining.

24. The system of claim 13 wherein in said means for adapting said wireless communication system said optimized economic benefit is determined by:

15 means for determining performance and cost of the adapted wireless communication system;

means for determining if said determined performance and cost satisfy the desired functionality; and

20 means for repeating said adapting means until said determined performance and cost satisfy the desired functionality.

25. A system for adapting a wireless communication system comprising:

at least one antenna;

at least one RF chain receiving a signal from one of said at least one antennas, said RF chain processing said signal to generate a RF output signal;

25 processing means for processing said RF output signal with one or more processing techniques to provide signal output; and

means for optimizing performance of said wireless communication system determined from said signal output and optimizing cost for implementing said wireless communication system to support a defined functionality by adapting said wireless  
30 communication system through selecting one or more of a number of said at least one

antennas, a number of said at least one RF chains and a type of said processing techniques.

26. The system of claim 25 comprising a plurality of said antennas and a plurality of said RF chains and further comprising select RF chain means for dynamically  
5 selecting one or more of said RF chains to be used in said adapted wireless network.

27. The system of claim 26 wherein said select RF chain means selects said one or more RF chains based on power consumption of said defined functionality.

28. The system of claim 26 wherein said select RF chain means selects said RF chain having the highest receive signal power.

10 29. The system of claim 25 comprising a plurality of said antennas and a plurality of said RF chains and further comprising select diversity means for selecting said plurality of antennas.

30. The system of claim 29 wherein said diversity comprises selection of said plurality of antennas for use in said system.

15 31. The system of claim 29 wherein said diversity comprises combining of said plurality of antennas with processing techniques selected from one or more of maximal ratio combining (MRC), equal-gain combining, and minimum mean square error (MMSE) combining.

20 32. The system of claim 29 wherein said diversity comprises antenna diversity obtained from said antennas using one or more of spatial diversity, beam diversity, polarization diversity, angular diversity, pattern diversity.